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A geospatial data system for the transition between the Colorado Plateau and Basin and Range provinces: An essential tool for basic and applied research in Earth science and urban ecology

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Many problems in earth science and ecology depend on an interdisciplinary approach for their investigation. We have begun to develop an earth science geospatial data system for the transition zone between the Colorado Plateau and Basin and Range Provinces. Our efforts have focused on the Tucson-Phoenix-Flagstaff (Arizona) corridor along which urban development is rapid, the geodynamics well manifest, and where much earth science data are already available. The project philosophy is to balance data compilation and distribution to the earth science community (the major driver of this endeavor) with "middleware" development for the processing of the data. Establishment of linkages between the data system and the data providers/producers will enable the "published" datasets on others' servers to be reprocessed/reprojected/analyzed on demand for users. One example of this integration is a university-state geological survey partnership that allows us to enhance access to state survey data as well as provide tools and digital data for state survey projects.

We report our progress so far: deployment of state wide 1:1,000,000 and Phoenix area 1:100,000 digital geologic map data in Arcview format, development of ASTER image processing tools, presentation of Arizona Earthquake Information Center seismicity data, and creation of a landslide data system for Arizona. The application of these efforts includes initial comparisons between high resolution geology, digital topography, and satellite imagery with urban ecologic parameters such as land cover and urban patterns for the greater Phoenix area. Our ultimate goal is for the data system to include: quantitative physicochemical data (chemical composition, mineralogy, density, magnetization, conductivity, etc.) of Earth materials at many scales; a classification of the materials into litho-, bio-, and chronostratigraphic rock units (or bodies); P-T-t (Pressure, Temperature, and time) paths for rock units; descriptions of the static geometry and kinematic history of structures; dynamic descriptions of active tectonic processes; and the geologic history of all rock bodies.